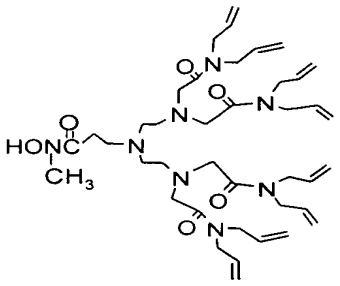
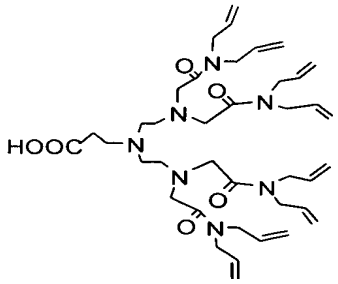
Figure 1

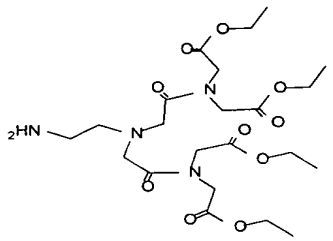
G3-(hydroxamide)-CH=CH_2



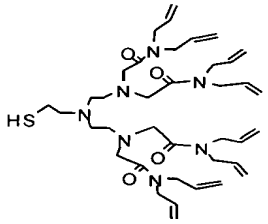
G3-(carboxylic)-CH=CH_2



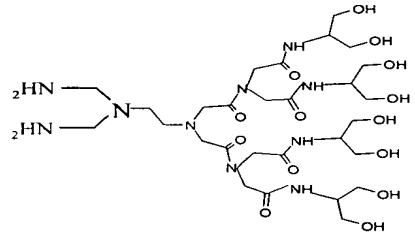
G2-(amine)-ester



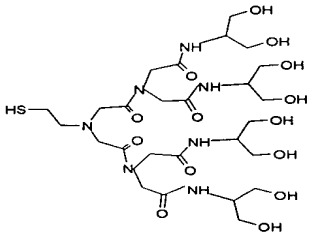
G3-(thiol)-CH=CH_2



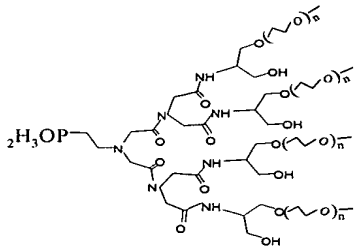
G3-(di-amine)-OH



G3-(thiol)-OH



G3-(di-carboxylic)-OH/PEG



G4-(di-carboxylic)-CH=CH_2/PEG

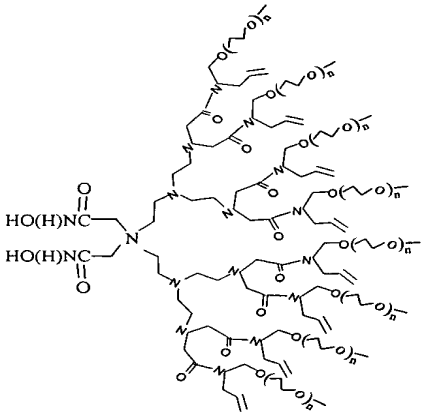


Figure 2

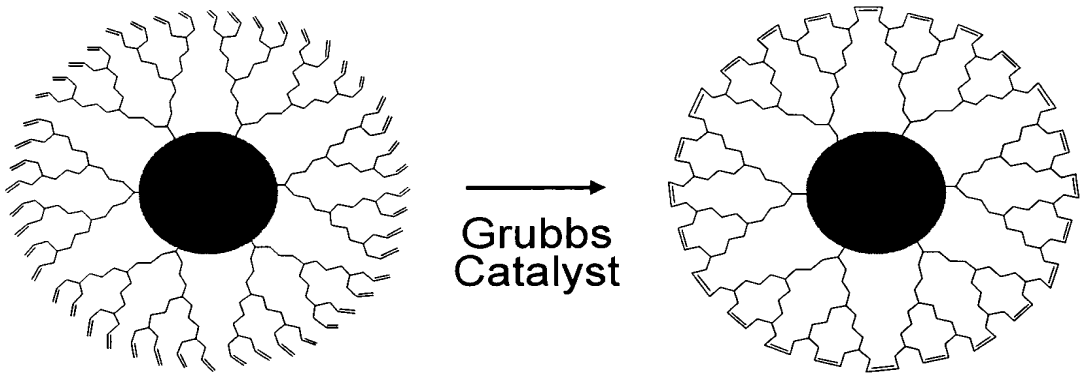


Figure 3

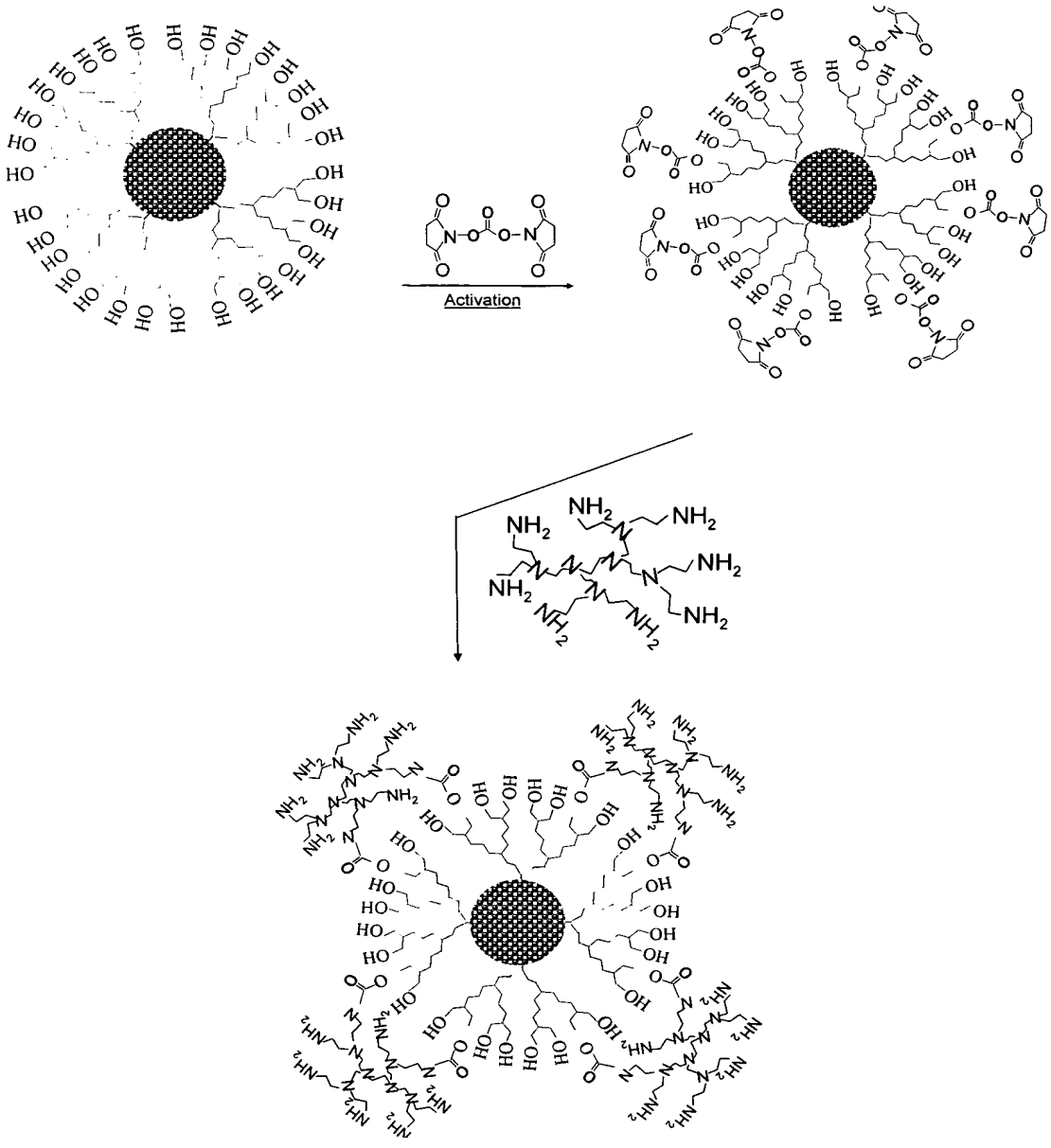


Figure 4

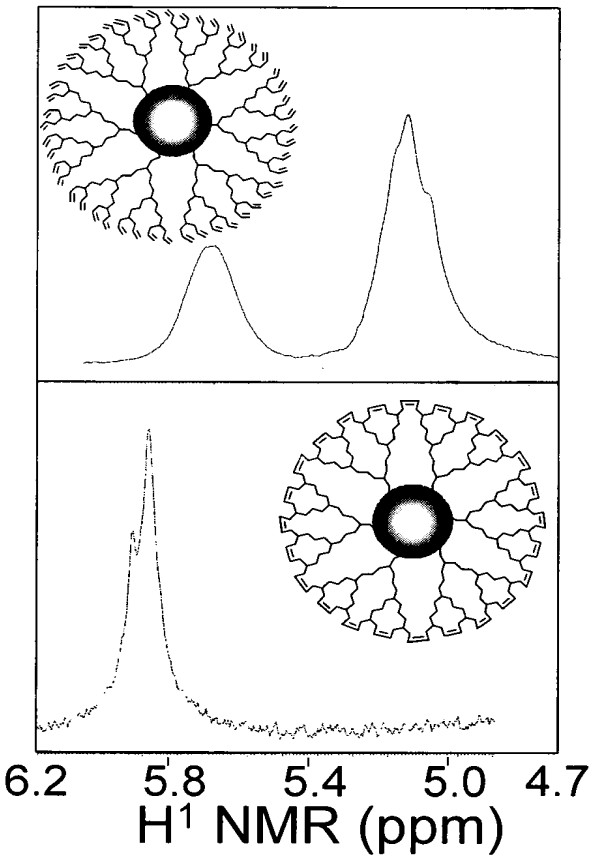


Figure 5

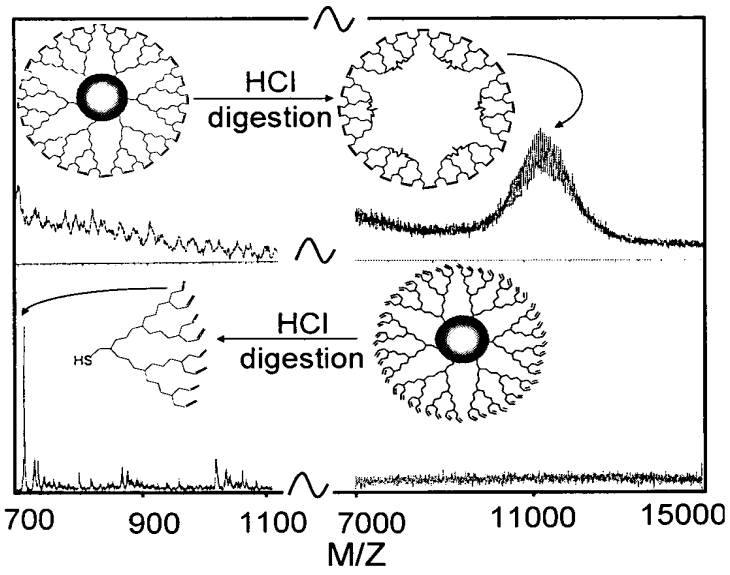

HCl
digestion
HCl
digestion
HS
700
900
1100
7000
11000
15000
M/Z

Figure 6

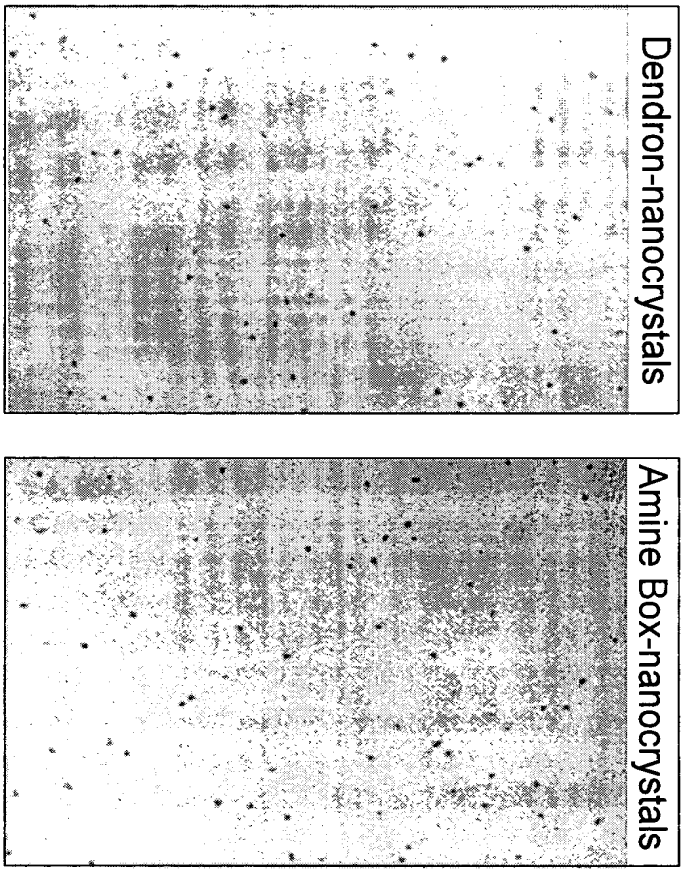


Figure 7

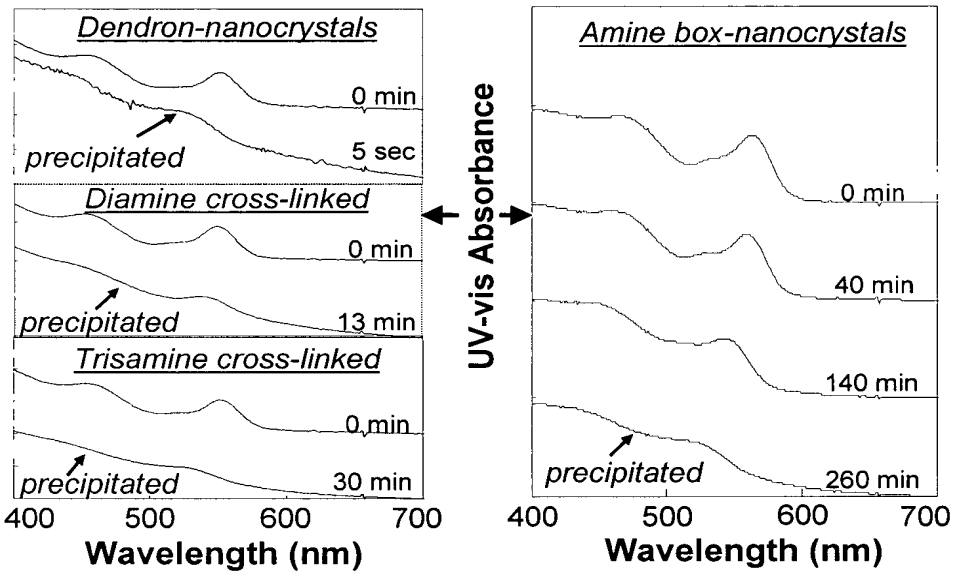

Dendron-nanocrystals
0 min
precipitated
5 sec
Diamine cross-linked
0 min
precipitated
13 min
Trisamine cross-linked
0 min
precipitated
30 min
400
500
600
700
Wavelength (nm)
UV-vis Absorbance
Amine box-nanocrystals
0 min
40 min
140 min
precipitated
260 min
400
500
600
700
Wavelength (nm)

Figure 8

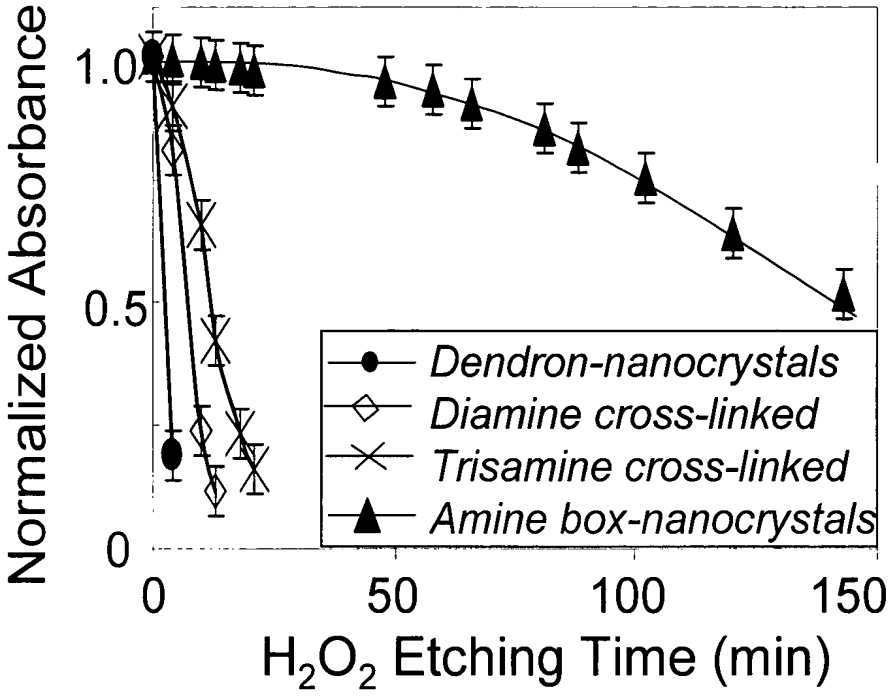

Normalized Absorbance
1.0
0.5
0
0
50
100
150
H_2O_2 Etching Time (min)
Dendron-nanocrystals
Diamine cross-linked
Trisamine cross-linked
Amine box-nanocrystals

Figure 9

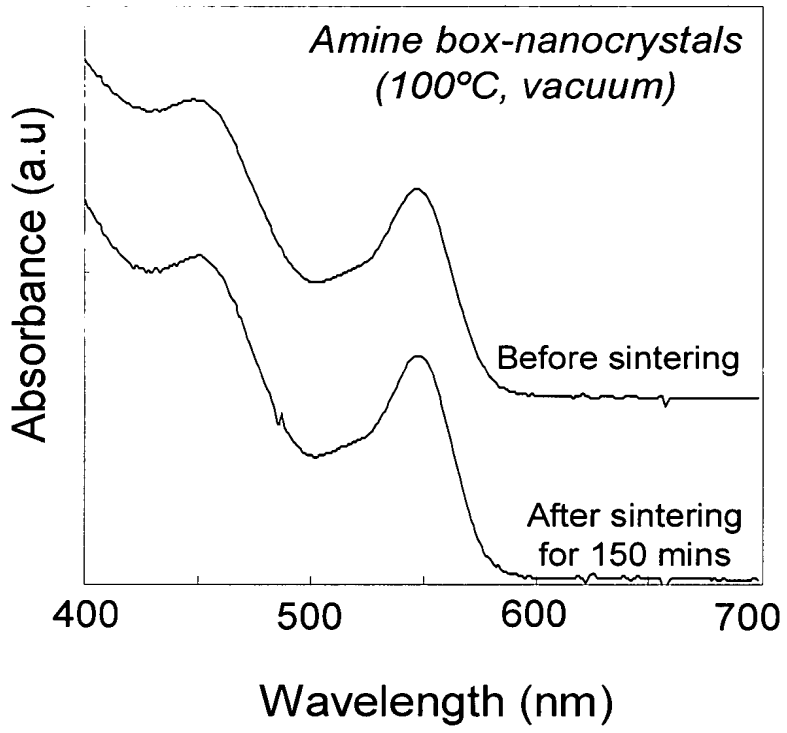

Amine box-nanocrystals
(100°C, vacuum)
Absorbance (a.u)
Before sintering
After sintering
for 150 mins
400
500
600
700
Wavelength (nm)

Figure 10

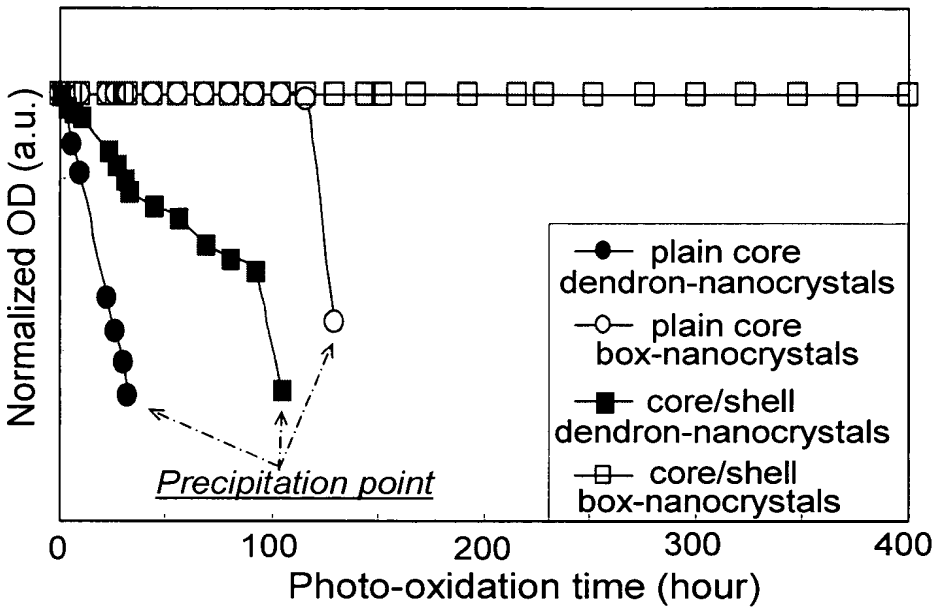

Normalized OD (a.u.)
Photo-oxidation time (hour)
0
100
200
300
400
Precipitation point
plain core dendron-nanocrystals
plain core box-nanocrystals
core/shell dendron-nanocrystals
core/shell box-nanocrystals

Figure 11

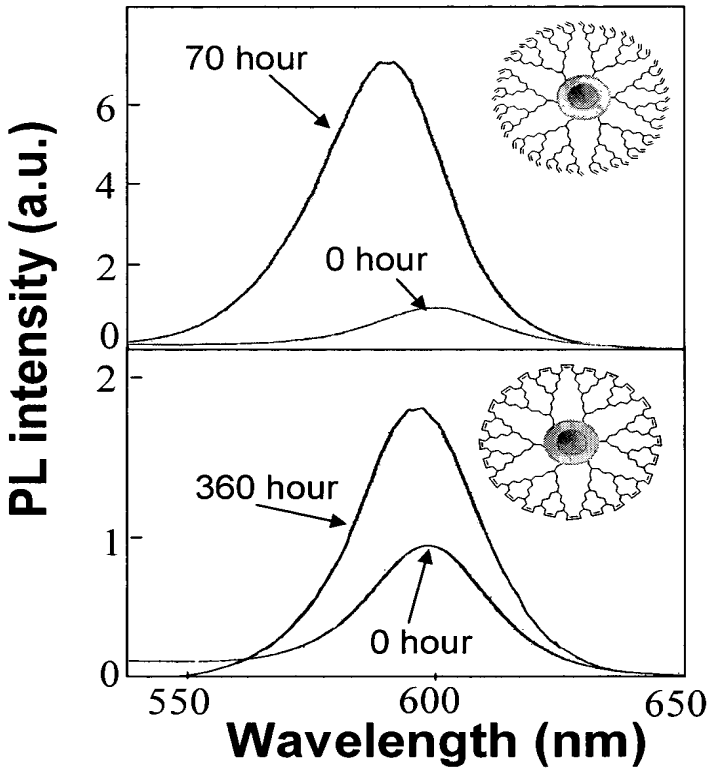

70 hour
0 hour
360 hour
0 hour
PL intensity (a.u.)
Wavelength (nm)
0
2
4
6
1
550
600
650

Figure 12

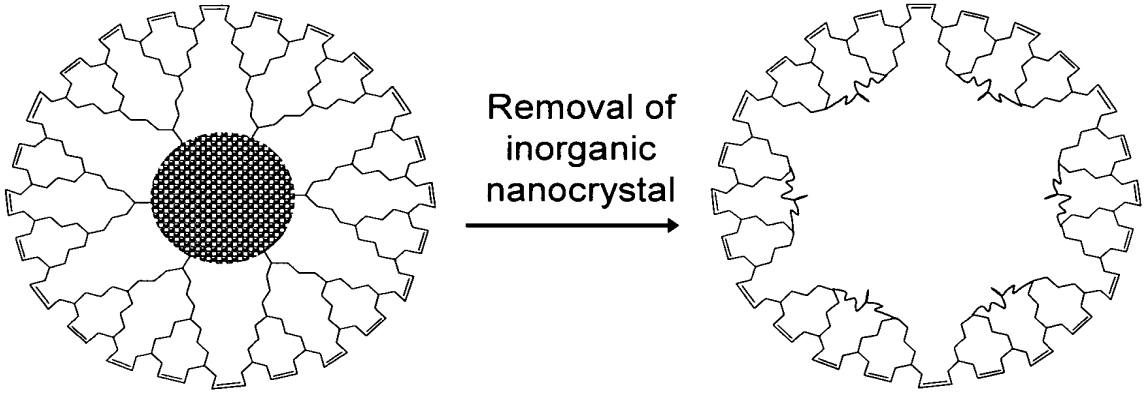


Figure 13

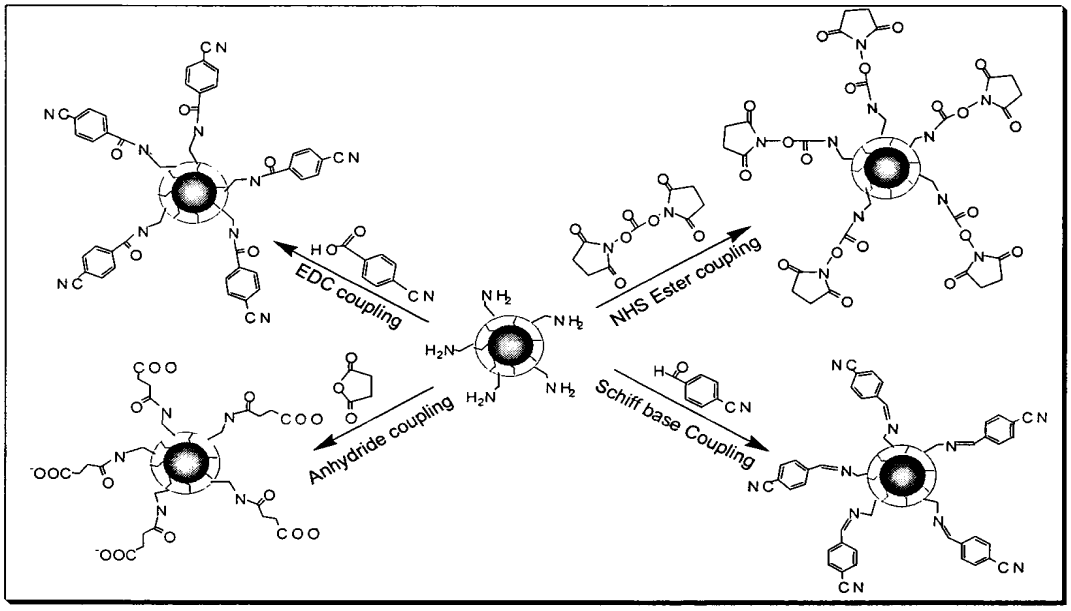

EDC coupling
NHS Ester coupling
Anhydride coupling
Schiff base Coupling

Figure 14

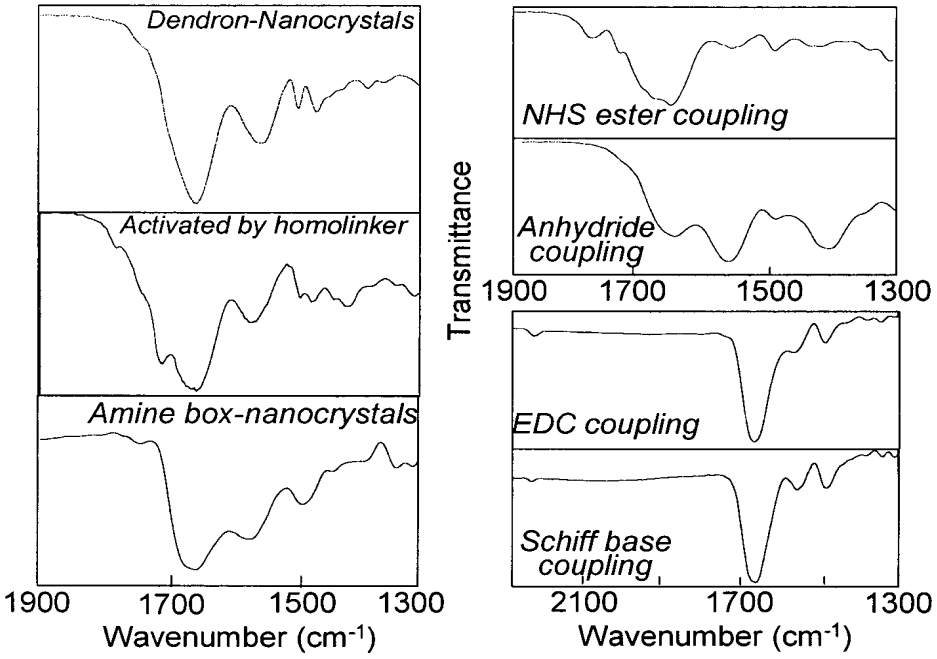

Dendron-Nanocrystals
Activated by homolinker
Amine box-nanocrystals
1900
1700
1500
1300
Wavenumber (cm-1)
Transmittance
NHS ester coupling
Anhydride coupling
EDC coupling
Schiff base coupling
2100
1700
1300
Wavenumber (cm-1)

Figure 15

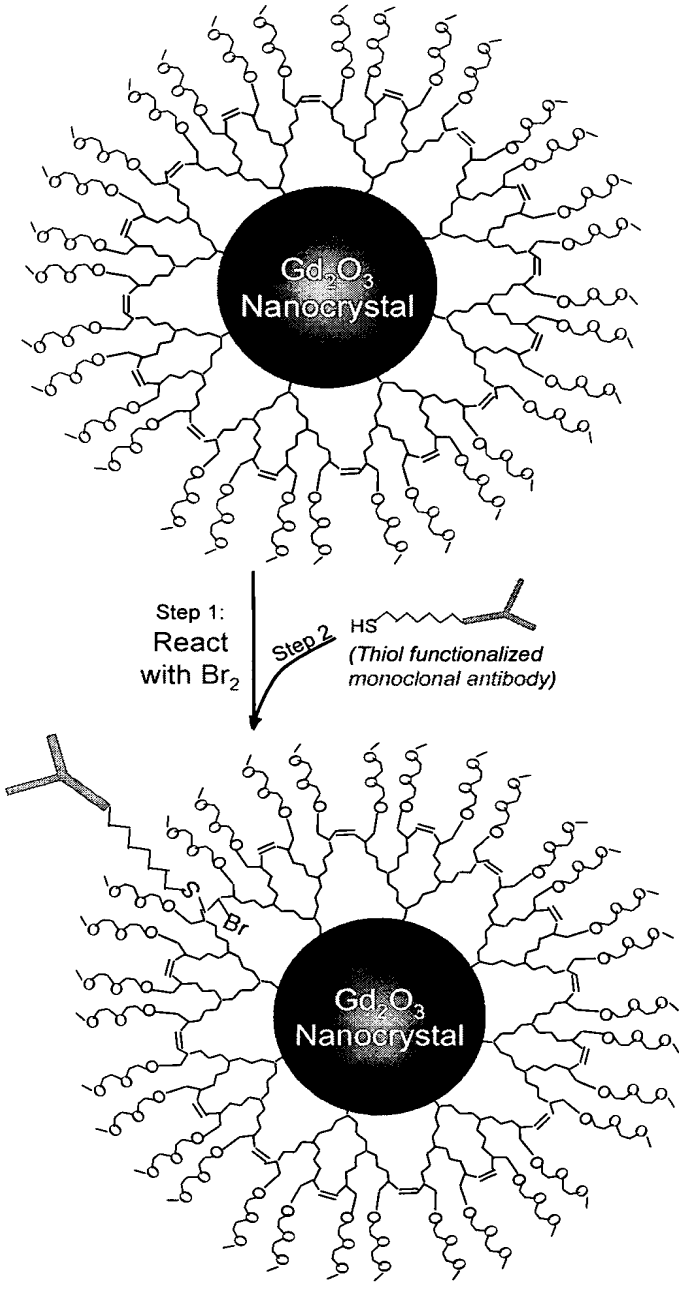

Gd_2O_3 Nanocrystal
Step 1:
React
with Br_2
Step 2
HS
(Thiol functionalized monoclonal antibody)
Br
Gd_2O_3 Nanocrystal

Figure 16

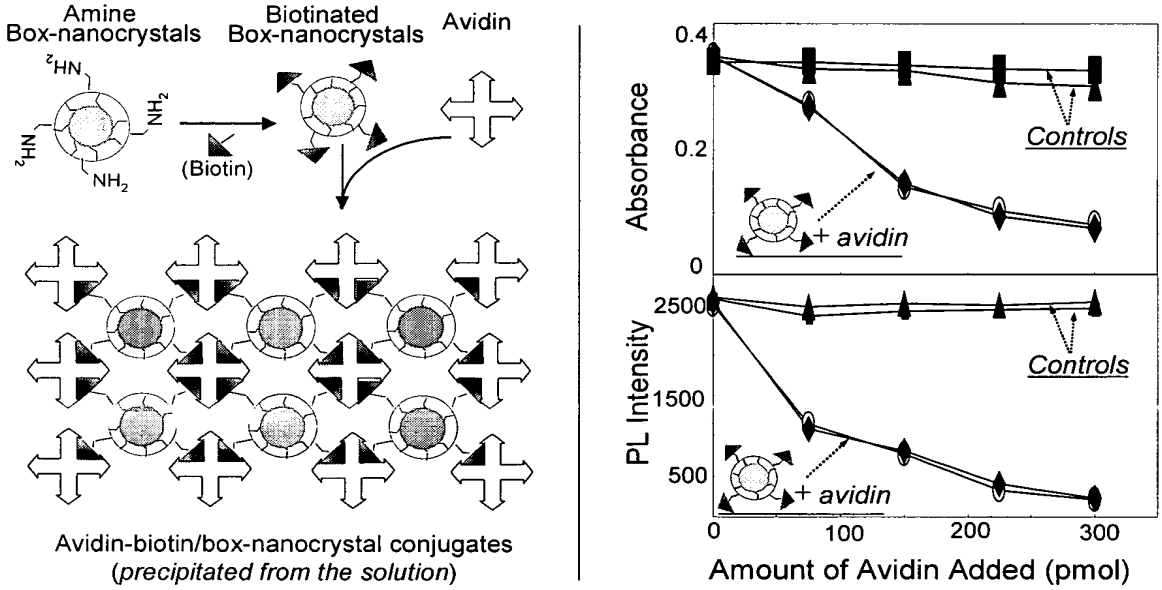

Amine
Box-nanocrystals
Biotinated
Box-nanocrystals
Avidin
(Biotin)
Avidin-biotin/box-nanocrystal conjugates
(precipitated from the solution)
Absorbance
0.4
0.2
0
Controls
+ avidin
PL Intensity
2500
1500
500
Controls
+ avidin
0
100
200
300
Amount of Avidin Added (pmol)

Figure 17

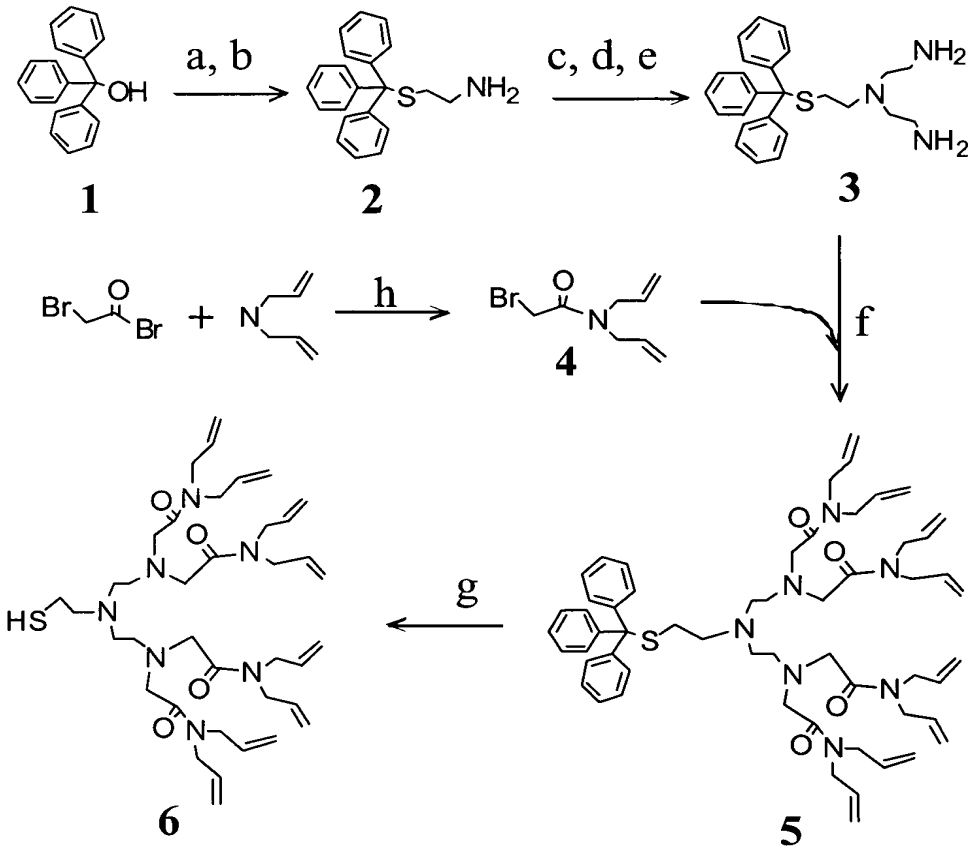

a, b
c, d, e
OH
S
NH2
N
NH2
NH2
1
2
3
Br
O
Br
+
N
h
Br
O
N
4
f
g
HS
N
N
O
N
O
N
O
N
O
N
O
N
O
N
O
N
O
N
O
N
O
N
6
5

Figure 18

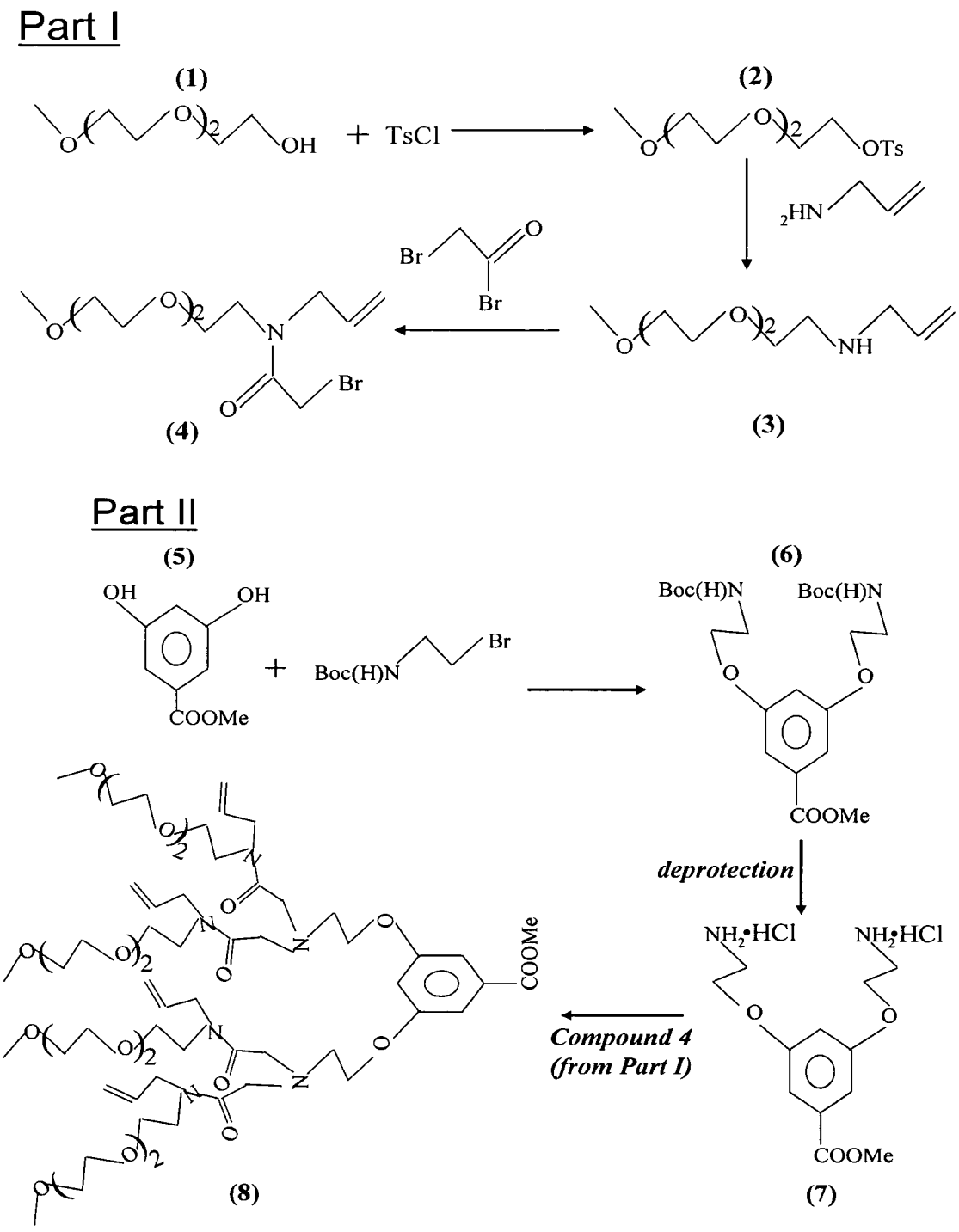

Part I
(1)
(2)
TsCl
OH
OTs
Br
Br
Br
NH
(4)
(3)
Part II
(5)
(6)
OH
OH
COOMe
Boc(H)N
Br
Boc(H)N
Boc(H)N
COOMe
deprotection
NH2•HCl
NH2•HCl
COOMe
Compound 4
(from Part I)
COOMe
(8)
(7)

Figure 19

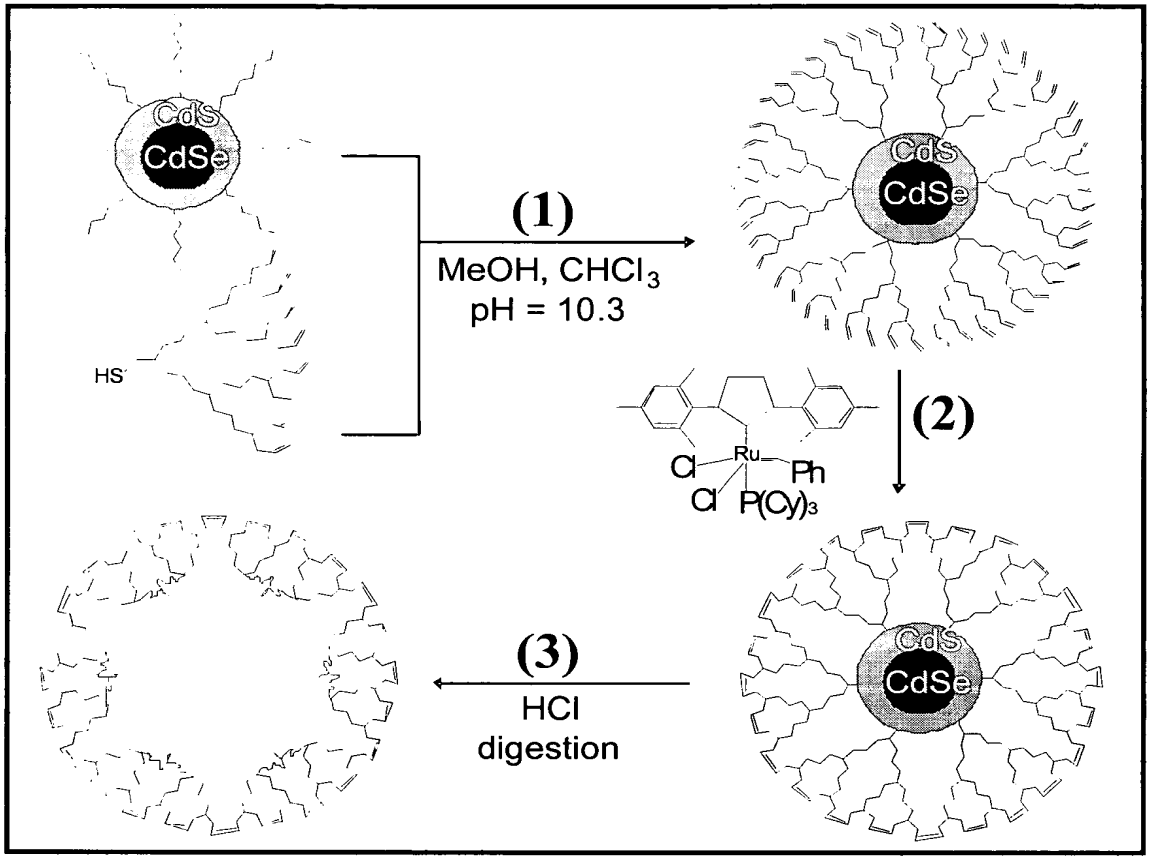
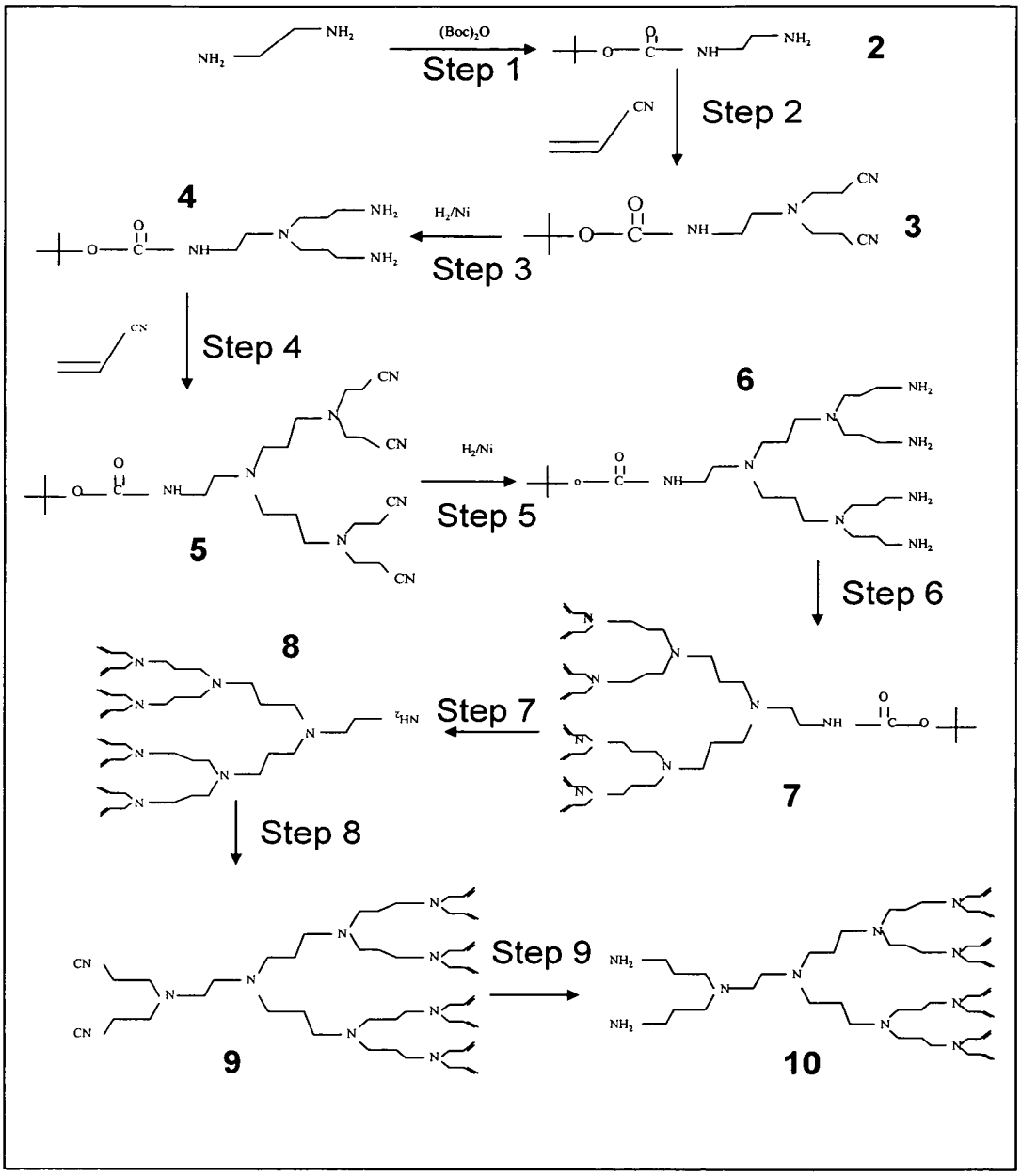

CdS
CdSe
HS
(1)
MeOH, CHCl3
pH = 10.3
(2)
Cl
Ru
Ph
Cl
P(Cy)3
(3)
HCl
digestion

Figure 20


(Boc)2O
Step 1
2
Step 2
3
H2/Ni
Step 3
4
Step 4
5
6
Step 5
Step 6
7
Step 7
8
Step 8
9
Step 9
10